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Serial No. 09/548,014
WLJ.051

#15 / Req. for
Reconsideration
4/23/03
Shm H

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent application of :
Knut Beekman et al. : Group Art Unit 2823
Serial No. 09/548,014 : Examiner M. Estrada
Filed April 12, 2000 :
A METHOD OF DEPOSITING A LAYER

REQUEST FOR RECONSIDERATION

Honorable Commissioner For Patents
Washington, D.C. 20231

Sir:

This is in response to the Office Action dated January 21, 2003.

Claims 4, 6-10 and 13-17 were rejected under 35 U.S.C. ¶102 or ¶103 as being unpatentable over Lee et al. (US 5,843,8431), taken alone or in combination with Ameen et al. (US 6,143,128) or Roy et al. (US 6,025,762) for the reasons stated at pages 2-6 of the Office Action. Applicants respectfully traverse this rejection with respect to the now-pending claims.

In the Office Action, the Examiner states:

“Lee et al. disclose treating the exposed surface with hydrogen ... and inherently the hydrogen treatment is such that the x-ray diffraction peak half width on a crystallographic plane of a deposited metallic layer is

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narrowed (Col. 19, lines 60+) wherein the metallic layer suffers a modification of its crystallographic structure wherein the metallic layer is aluminum or an aluminum alloy (Col. 1, line 46), because the same materials are treated in the same manner as in the instant invention.” (Emphasis added).

Respectfully, the Examiner is factually incorrect on two counts. First, Lee et al. does not describe a process in which the same materials are treated in the same manner as in the present invention. Second, it does not follow from the teachings of Lee et al. that the hydrogen treatment achieves a narrowing of the x-ray diffraction peak half width on a crystallographic plane of the deposited metallic layer.

The Examiner seems to rely on the assumption that the particular hydrogen treatment of Lee et al. is inevitably a disclosure of all hydrogen treatments. This clearly cannot be correct. First any process could be chemical or physical or a combination of the two. Lee et al. clearly discloses a gentle treatment in which the surface portion of the under layer is H terminated to improve wetting or to improve grain mobility. Such effects would happen at low powers and for short periods of treatment time and with zero bias voltages, and once the process was completed it would be stopped.

Such chemical processes will not survive atmospheric exposure and Lee et al. indeed teaches that his process should be run after such exposure. In contrast, the much more powerful treatment of the embodiments of the present invention will survive exposure to atmosphere, because it is indeed a different process.

The nature of the process Lee et al. is clearly stated at lines 17 to 26, column 10, and in the corresponding passage at the bottom of column 11. Lee et al. does not disclose all possible hydrogen treatments, but only those which achieve H-termination. Further, it is fundamental to the invention Lee et al. that the wearability of the surface layer is improved and this is said to give aluminum of larger grain size.

During prosecution of the British priority application corresponding to the present application, the British Examiner cited a Japanese Patent 7142412, which was cited to the Examiner in an Information Disclosure Statement dated June 1, 2000. This Japanese Patent talks about changing oxygen termination into hydrogen termination and the purpose of this is to enable the tungsten atoms to more easily displace the hydrogen atoms, so that the tungsten can be firmly bonded to the insulating layer. It seems extremely likely that this is what is happening in Lee et al. and again illustrates that not all hydrogen treatments are the same. If such a surface were re-exposed to oxygen the hydrogen would be

quickly removed and the oxygen terminations resubstituted. Hence the comments above about exposure to the atmosphere.

This shows, therefore, that Lee et al. is substantially directed a surface effect, which would not be expected to change the crystallography. The FWHM that RXD measures is a function of the crystallography of the deposited layer and, in particular the orientation of the crystal planes, and so a person skilled in the art would not expect Lee et al. to alter this value. The fact that Lee et al. is creating large grains does not inherently mean that there is a narrowing of the x-ray diffraction peak half width on a crystallographic plane of the deposited metallic layer.

The process of the present alters the crystallography, and this arises, for example, as is explained in the embodiments of the present specification, from the hydrogen being effectively used in a sputteretch mode which causes a permanent change to the nature of the underlying layer. Lee et al. does not disclose or suggest a process which results in a narrowing of the x-ray diffraction peak half width on a crystallographic plane of the deposited layer.

For at least the reasons stated above, Applicants respectfully contend that Claims 4, 6-10 and 13-17 define over Lee et al., taken alone or in combination with Ameen et al. or Roy et al.

No other issues remaining, reconsideration and favorable action upon the
Claims 4, 6-10 and 13-17 now-pending in the application are requested.

Respectfully submitted,

KNUT BEEKMAN ET AL.

By:



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April 21, 2003

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